CLAIMS

1. A metallic material for fuel cells comprising:

0.20 percent by mass or less of C;

0.02 to 1.0 percent by mass of Si;

2.0 percent by mass or less of Mn;

10 to 40 percent by mass of Cr;

0.03 to 5.0 percent by mass of Mo;

0.1 to 3.0 percent by mass of Nb;

at least one element selected from the group consisting of Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Zr, and Hf in a total of 1.0 percent by mass or less; and

the balance composed of Fe and inevitable impurities;

wherein $0.1 \leq Mo/Nb \leq 30$ is satisfied.

2. The metallic material for fuel cells according to claim 1, further comprising a precipitate containing Fe, Cr and Si at contents on the basis of the metallic material satisfying the following equation (1):

[precipitated Fe]+[precipitated Cr]+[precipitated Si] $\geq$ 0.01 percent by mass ... (1)

wherein,

[precipitated Fe]: content (percent by mass) of Fe in the precipitate;

[precipitated Cr]: content (percent by mass) of Cr in the precipitate; and

[precipitated Si]: content (percent by mass) of Si in the precipitate.

3. The metallic material for fuel cells according to claim 1 or 2, wherein in use at a cell operating temperature of 800°C for at least 1,000 hours or more, the Fe, Cr and Si contents in the precipitate on the basis of the metallic material satisfy the following equation (2):

[precipitated Fe]+[precipitated Cr]+[precipitated Si] ≥ 0.03 percent by mass ... (2)

wherein,

[precipitated Fe]: content (percent by mass) of Fe in the precipitate;

[precipitated Cr]: content (percent by mass) of Cr in the precipitate; and

[precipitated Si]: content (percent by mass) of Si in the precipitate.

4. The metallic material for fuel cells according to any one of claims 1 to 3, wherein the metallic material for fuel cells is a hot-rolled material.

5. The metallic material for fuel cells according to any one of claims 1 to 3, wherein the metallic material for fuel cells is a cold-rolled material.

6. The metallic material for fuel cells according to claim 4 or 5, wherein the metallic material is further subjected to a precipitation treatment so that the Fe, Cr and Si contents in the precipitate on the basis of the metallic material satisfy the following equation (3):

[precipitated Fe]+[precipitated Cr]+[precipitated Si] ≥ 0.02 percent by mass ... (3)

wherein,

[precipitated Fe]: content (percent by mass) of Fe in the precipitate;

[precipitated Cr]: content (percent by mass) of Cr in the precipitate; and

[precipitated Si]: content (percent by mass) of Si in the precipitate.

7. The metallic material for fuel cells according to any one of claims 1 to 6, wherein the metallic material for fuel cells is used for solid-oxide fuel cells.

8. The metallic material for fuel cells according to any one of claims 1 to 6, wherein the metallic material for fuel cells is used for interconnects of solid-oxide fuel cells.

9. A solid-oxide fuel cell using the metallic material for fuel cells according to any one of claims 1 to 8.

10. A method for producing a metallic material for fuel cells comprising:

re-heating a steel material, if required;

hot-rolling the steel material; and

annealing and picking the hot-rolled sheet, if required;

wherein the steel material is adjusted to contain:

0.20 percent by mass or less of C;

0.02 to 1.0 percent by mass of Si;

2.0 percent by mass or less of Mn;

10 to 40 percent by mass of Cr;

0.03 to 5.0 percent by mass of Mo;

0.1 to 3.0 percent by mass of Nb;

at least one of element selection from Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Zr, and Hf in a total of 1.0 percent by mass or less; and

the balance composed of Fe and inevitable impurities; and

$0.1 \leq Mo/Nb \leq 30$ is satisfied.

11. The method for producing a metallic material for fuel cells according to claim 10, wherein the metallic

material for fuel cells further comprises a precipitate containing Fe, Cr and Si at contents on the basis of the metallic material satisfying the following equation (1):

[precipitated Fe]+[precipitated Cr]+[precipitated Si] ≥ 0.01 percent by mass ... (1)

wherein,

[precipitated Fe]: content (percent by mass) of Fe in the precipitate;

[precipitated Cr]: content (percent by mass) of Cr in the precipitate; and

[precipitated Si]: content (percent by mass) of Si in the precipitate.

12. The method for producing a metallic material for fuel cells according to any one of claims 10 and 11, further comprising cold-rolling or cold-rolling, annealing, and then pickling.

13. The method for producing a metallic material for fuel cells according to any one of claims 10 to 12, further comprising performing a precipitation treatment of the metallic material for fuel cells so that the Fe, Cr and Si contents in the precipitate on the basis of the metallic material satisfy the following equation (3):

[precipitated Fe]+[precipitated Cr]+[precipitated Si] ≥

0.02 percent by mass ... (3)

wherein,

[precipitated Fe]: content (percent by mass) of Fe in the precipitate;

[precipitated Cr]: content (percent by mass) of Cr in the precipitate; and

[precipitated Si]: content (percent by mass) of Si in the precipitate.

14. The method for producing a metallic material for fuel cells according to any one of claims 10 to 13, further comprising pressing the metallic material for fuel cells.

15. The method for producing a metallic material for fuel cells according to any one of claims 10 to 13, further comprising cutting the metallic material for fuel cells.

16. The method for producing a metallic material for fuel cells according to any one of claims 10 to 13, further comprising corrugating the metallic material for fuel cells.

17. The method for producing a metallic material for fuel cells according to any one of claims 10 to 13, further comprising etching the metallic material for fuel cells.

18. The method for producing a metallic material for fuel cells according to any one of claims 10 to 17, wherein the metallic material for fuel cells is used for solid-oxide fuel cells.

19. The method for producing a metallic material for fuel cells according to any one of claims 10 to 17, wherein the metallic material for fuel cells is used for interconnects of solid-oxide fuel cells.